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# **Agricultural and Rural Finance Markets in Transition**

Proceedings of Regional Research Committee NC-1014  
St. Louis, Missouri

October 4-5, 2007  
*Dr. Michael A. Gunderson, Editor*  
January 2008  
Food and Resource Economics  
University of Florida  
PO Box 110240  
Gainesville, Illinois 32611-0240

# **Investigating Gender Bias in Farm Service Agency's Lending Decisions**

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## ***Background***

Federal involvement in farm credit is guided by the government's mission to assist underserved sectors of the farm economy experiencing difficulty in gaining access to borrowing funds through the regular lending channels. These borrowers include small, beginning farmers considered as high risk borrowers by commercial lenders due to their inadequate business track records and inferior net worth positions. Moreover, the federal credit program is also designed to accommodate borrowers who have been subjected to racial, ethnic or gender prejudice by other lenders.

Today, one avenue the federal government uses to provide credit to farmers is through the Farm Service Agency (FSA) operating under the U. S. Department of Agriculture (USDA), which implements direct and guaranteed loan programs as temporary sources of credit for farm businesses. The target of the agency is to accommodate high-risk farm borrowers with direct loans and eventually graduate them to the guaranteed lending program. Once this is achieved, FSA expects these borrowers to successfully satisfy the guaranteed loan provisions and seek credit from conventional agricultural lenders (FmHA-USDA, 1988).

In recent years, however, the USDA has encountered accusations of inequities in the administration of loan programs. While most of these allegations and suits involve racial bias (such as the famous class action suit "Pigford vs. Glickman" in 1997), there have been some instances when female borrowers accused FSA of discrimination. In response to such allegations, the Secretary of Agriculture formed the Civil Rights Action Team (CRAT) to investigate the claims. CRAT concluded that discrimination, often extreme, had taken place during the years 1981 to 1996, and CRAT made 92 recommendations to end such practices. These recommendations cover far-reaching areas for change which included holding USDA

managers accountable for ensuring the civil rights of all employees and customers, making USDA programs accessible to all customers, creating a diverse workforce and improving the organizational structure of civil rights.

***Objective:***

This research is an extension of a recently published study that analyzed racial minority lending trends in FSA during the five-year decree period 1999-2003 (Escalante, Brooks, Epperson and Stegelin, 2006). This study shifts its focus from racial minorities to female borrowers considered as non-traditional borrowers. This study derives its motivations from the allegations of gender bias made by the women plaintiffs in a more recent lawsuit against the FSA, *Love v. Johanns*, alleging women discrimination in the administration of FSA lending programs. The female plaintiffs have tried to elevate their cases into a class action suit status, but their motion was denied by judicial courts due to findings of a “lack of commonality” in the evidences presented by the women-farmer complainants. An empirical framework is developed to verify such “commonality” argument used by the courts to deny the female farmers’ motion for class certification of their lawsuit. This study utilizes actual FSA loan application data during the period 1999-2002 to identify significant determinants of decisions made by FSA on loan approvals and amounts disbursed to successful applications. The model accommodates proxy variables for financial performance measures conventionally used by regular, commercial lenders in the evaluation of loan applications. Demographic, structural variables are also included to capture the influence of gender, racial, size and location factors in decisions made by FSA loan officers.

### ***Empirical Framework:***

This study addresses the commonality issue raised in the Courts' decisions on the female farmers' motion for class certification through an econometric analysis of decisions made by FSA loan officers in evaluating a subset of loan applications from both male and female farmers in Georgia. This analysis draws from some aspects of the methodology used in the earlier FSA study on racial minority lending trends (Escalante, et al., 2006) and incorporates them in a modified econometric model. The current empirical model retains the financial performance variables used in the previous study that are taken from traditional credit risk assessment models adopted by commercial lending institutions. The empirical analysis also considers the borrowers' structural/demographic attributes (such as farm size, race, gender and location) to determine the relative strengths of objective credit risk assessment criteria among separate models for certain social classes of FSA borrowers.

A general model based on the entire sample of FSA loan applications addresses the gender discrimination issue through the inclusion of a gender indicator variable. Two additional models are estimated using subsets of observations sorted by gender classifications as a means of searching for inconsistencies in the application of credit risk assessment criteria.

### ***FSA Borrower Data***

The borrower data used in this study were obtained from the loan application database of the Georgia FSA State office for the period 1999-2002. This study's dataset consists of a sampling of approved and rejected loan applications which were compiled using separate sampling techniques. The Georgia FSA State office selected the approved loan observations using simple random sampling procedures. On the other hand, the FSA office supplied a summary of all documented loan application denials, from which all usable loan observations

were identified for this study. Information extracted from the loan portfolios include borrower declarations from income statements and balance sheets, in addition to information of the ethnic background and gender of the primary borrowers. Portfolio data were verified by FSA loan officers through tax returns, lien searches, and credit checks.

Table 1 presents a summary of the approval and rejection rates of the entire sample and sub-groupings according to racial and gender classifications. The dataset consists of 367 loan applications filed with the agency from 1999 to 2002. In terms of racial classification, white farmers comprise the majority (85.83%) of this study's sample with 315 observations. The dominant gender class is the male borrower with 88.01% of the study's sample (323 observations).

This study's dataset has a loan approval rate of 57.22% (210 out of 367 loan applications). The approved loan observations used in this study represent 7.85% of the 2,676 loan applications approved by the FSA from 1999 to 2002.

The Georgia FSA State Office has compiled a total of 330 records of rejected loan applications with some documents on file. This figure is believed to be understated if the undocumented cases of rejection and application withdrawals are taken into consideration. It is possible that loan rejection could have occurred even before borrowers could have submitted their loan application documents. These decisions, probably based primarily on basic program eligibility considerations, could have been made by loan officers after a quick phone call or a short interview with the prospective borrowers.

As a result of the understated aggregate loan rejection numbers, this study's (documented) rejection rate of 47.48% is much larger than its approval rate. The denied loan observations used in this study consist of applications with complete, usable records kept by the

eight FSA district offices in the state. More than half of the loan rejection records have very minimal information (hence, were unusable and discarded for this study's purposes).

Heckman maximum likelihood regression techniques, as suggested by Heckman (1978), will be used for this analysis. In the first stage, a probit regression is computed in order to estimate the probability of approval of a prospective FSA borrower's loan application. This regression is used to estimate the inverse Mills ratio for each borrower, which is used as an instrument in the second regression. The second stage applies to the uncensored observations (approved loan applications) and identifies significant determinants of decisions on loan amount disbursed to successful loan applicants.

This analysis employs the maximum likelihood approach, instead of the Heckman two-step procedure, in estimating the Heckman model. Under the maximum likelihood method, the outcome and selection models are jointly estimated. Previous studies using the Heckman approach contend that even with correct model specification, the two-step procedure produce less efficient estimates than those obtained from the full maximum likelihood method (Sales, et al, 2004; Balla and Reinhardt, 2003).

In this analysis, the expanded form of the selection equation is given as :

$$(1.4) \quad z_i^* = \gamma_0 + \gamma_1 FV + \gamma_2 ST + \mu_i$$

where FV is a set of proxy financial measures and ST is a set of structural and demographic dummy variables.

The FV variables are defined based on financial performance categories considered as important indicators of borrowers' credit risk. These categories include leverage, profitability, financial efficiency, liquidity and repayment capacity. The following financial performance measures representing such categories have been identified from various experiential and

statistical credit risk assessment models developed by lenders and analysts which are published in agricultural finance literature (Miller and LaDue; Turvey; Splett, et al.; Kohl): debt-asset ratio (leverage), return on assets (profitability), net farm income ratio (financial efficiency), current ratio (liquidity) and capital debt repayment margin ratio (repayment capacity).

The ST dummy variables are also included to discern whether the loan approval process is significantly influenced by size, racial, gender and FSA program considerations. These include SIZE (which takes on a value of 1 for small farms with gross revenues below \$250,000, and 0 otherwise), NONWHITE (with a value of 1 for nonwhite borrowers and 0 otherwise, to capture racial impact), FEMALE (with a value of 1 for a female primary borrower and 0 otherwise, to discern gender impact) and DIRECT LOANS (which takes on a value of 1 for loans accommodated under the direct lending programs and 0 otherwise).

The expanded form of the outcome equation is given by:

$$(1.5) \quad y_i = \beta_0 + \beta_1 FV + \beta_2 ST + \beta_3 LOC + \beta_4 REQ + \mu_i.$$

The FV and ST variables in the selection equation (1.3) are retained in the outcome equation, with the addition of two sets of variables that could determine the magnitude of FSA loan exposure to successful loan applicants. These new categories are LOC, a set of geographic dummy variables, and REQ, which are a pair of financial measures considered as clear loan amount indicators.

The LOC variables account for differences in certain farming areas in the state, defined by distinct concentration of farm activities that could result in differentiated demands for FSA financial assistance. The observations in this analysis were obtained from eight FSA loan districts. For purposes of this study, however, some contiguous loan districts were combined based on climate and homogeneity of farm production profiles of certain regions. The location

dummies used are CENTRAL, EAST, SOUTH, SOUTH-D6 and NORTH, which was the excluded category.<sup>4</sup>

The REQ variables include WC, an estimate of the farm's working capital requirement (the difference between current assets and current liabilities), and Asset Turnover Ratio, calculated as the ratio of gross farm revenues to total farm assets, to account for the productivity of the farms' existing assets.

## **Results**

Tables 2 to 4 present the results from various analytical approaches used in this study. The descriptive analysis results allow the comparison of mean financial performance values across loan decision and gender categories. Results from this analysis are important in understanding certain identifiable trends in the econometric and credit risk assessment prediction models. The Heckman selection model verifies the existence of gender bias and establishes the relative importance of financial performance and structural variables in FSA loan approval and amount decisions.

### *Descriptive Analysis*

A significance test of the differences in the mean values of financial performance variables reported in Table 2 indicates that farms with successful loan applications have better profitability, repayment and liquidity conditions than those whose applications were rejected. Among the racial classes, white farmers have significantly larger operations (in terms of assets and revenues) with more favorable profitability, financial efficiency and liquidity results than the

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<sup>4</sup> Specifically, the FSA Districts 2 and 5 were combined to form the CENTRAL region; Districts 3 and 4 were merged as the EAST region; Districts 7 and 8 were combined into the SOUTH region; and District 1 was retained as the NORTH region. One strategic exception was made. District 6, though located in South Georgia, was set apart from the SOUTH region and designated SOUTH-D6. Loan size on average was much higher in SOUTH-D6 – about 64% higher than for the SOUTH region. Further, gross farm income was 35% higher in SOUTH-D6 than in SOUTH on average. In this analysis, the excluded category among the regional dummy variables is the NORTH region.

non-white farmer applicants. This comparative analysis based on race shall become useful in analyzing trends in the econometric results.

Interestingly, while male farmers in this study's sample have larger gross revenues, their female counterparts have significantly better financial efficiency, repayment and leverage ratios. Moreover, larger loan amounts are associated with approved loan accounts as well as white and female applicants.

Table 3 introduces another layer in the gender class analysis by incorporating the loan approval decision classification. At the 95% confidence level, the approved male and female applications expectedly have superior financial conditions than their respective rejected counterparts. However, in comparing inter-gender loan approval decision categories, rejected male farm operators have larger farm assets and gross revenues than the rejected female applicants. On the other hand, successful female applicants have significantly higher repayment, leverage and financial efficiency ratios than male farm operators with approved loan applicants, although the latter larger gross revenues and better profitability (return on assets) than the successful female loan applicants in this study's sample.

### *Econometric Analysis*

The results of the Heckman maximum likelihood estimation are presented in Table 4. All three models (general, male and female borrower models) have strong, adequate explanatory power, given their significant Wald chi-square statistics. Results of the LR tests of independence also confirm separability of decisions made on approval/rejection of loan applications and the amount of loan disbursed to successful loan applicants across all three models.

In terms of the likelihood of loan application approval, a predominant trend in the general and segregated gender models is the significance of only one financial performance variable

(repayment margin ratio). This is consistent with FSA established guidelines for credit risk assessment that single out the importance of repayment capacity, among other financial performance areas.

The resulting coefficients and significance of the program dummy variable (Direct Loan) in all three models suggest that applications under the guaranteed lending program have a greater chance of approval. It is apparent that the inclusion of a third party (the lending institution that has previously assessed the loan application) in a guaranteed lending arrangement with the FSA can enhance the likelihood of loan approval. Also, larger operations also tend to succeed more in their loan applications than smaller farms in the general and male borrower models.

The loan amount decision, on the other hand, is not influenced by an identical set of regressors. Working capital estimates exert significant influence in the general and female borrower models while asset productivity (turnover) ratios are more important in the male borrower model. The significant positive coefficient of the latter variable suggests that farms with higher fixed asset capacity utilization (versus farms with more idle, unused assets resulting in lower asset turnover ratios) can avail of higher loan amounts.

Interestingly, successful female loan applicants receive higher loan amounts, as suggested by the significant positive Female dummy coefficient in the General Model. As in the loan approval decision, guaranteed loan applicants also receive larger loan amounts than those borrowing under the direct lending program. This result is consistent with the higher loan limits established for guaranteed loan programs vis-à-vis direct loans. Size is another consistent, logical determinant of loan amounts in all three models. Larger farm businesses have higher capital outlays and working capital requirements, hence, would request for larger loan amounts compared to smaller farms. The results for the location dummy variables indicate that borrowers

from the North region, where the more capital-intensive operations of livestock producers are more heavily concentrated, usually receive larger loans than borrowers from the East, South, South-District 6, and Central regions.

Focusing on the gender issue, there are two compelling evidences in this analysis that refute the “commonality” claim of the women farmer plaintiffs in the Love v. Johann case. First, the insignificance of the gender dummy variable (female) in the general model’s selection (loan approval) equation indicates that the applicants’ gender does not influence loan approval decisions. Second, the results for the selection equations of the segregated gender models for male and female borrowers do not reveal any disparity in the objective criteria for loan approval decisions. Both models produce the same single significant financial performance variable (repayment) that influences loan approval decisions.

The results of the outcome equations (loan amount decision) provide the departure points. As discussed earlier, female applicants with approved loan applications are able to enjoy larger loan amounts than male borrowers. This is not surprising since the female borrowers in this sample generally have better financial performance measures than their male counterparts. The results of the segregated gender models, however, reveal the FSA loan officers’ reliance on certain financial ratios (leverage and repayment), in addition to program type, size and location considerations, to make loan amount decisions for successful female loan applicants. In contrast, only racial, program type, location and size considerations are factored into the loan amount decision-making process for male borrowers. Among these, it is interesting to note that white farmers, owing to their larger operations and more favorable financial conditions, are able to avail of larger loan amounts among the successful male loan applicants.

## **Summary and Conclusions**

This study has verified the claim of commonality of circumstances surrounding the denial of loan applications from women farmers as alleged by the plaintiffs in the Love v. Johanns lawsuit. This analysis does not produce any overwhelming evidence of gender discrimination in the loan approval decisions made by FSA loan officers for a sample of Georgia farm loan applications. Contrary to allegations, results of our Heckman selection model indicate that successful women farmers in this sample were given relatively larger loans than their male counterparts. This trend is logically expected considering that the women farmers in the sample have more favorable financial performance conditions than male farmers. Caution, however, must be observed in interpreting the econometric results considering the small proportion of farm observations operated by women farmers relative to the sample size. Moreover, the FSA office's loan denial database, from which this study's observations were drawn, is believed to be understated if the undocumented cases of rejection and application withdrawals are taken into consideration. Nonetheless, this study presents some evidence that can motivate further investigation of the commonality issue of gender discrimination, hopefully with a larger, more extensive sampling of FSA loan applications.

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**Table 1. Loan Data Sampling and Approval Rates of Georgia FSA Loans, 1999-2002**

Categories	Number of Borrowers		Approval Rate (Class Sample)	Approval Rate (Study's Sample)	Proportion to Georgia FSA Approved and Rejected Loans	
	Approvals	Rejections			Approved	Rejected

			%	%		
All Loans	210	157	57.22	57.22	7.85	47.48
White Borrowers	189	126	60.00	51.50	7.06	38.18
Non-White Borrowers	21	31	40.38	5.72	0.78	9.39
Male Borrowers	181	142	56.04	49.32	6.76	43.03
Female Borrowers	30	14	68.18	8.17	1.12	4.24

**Table 2. Means of Financial Performance Measures by Loan Decision, Racial and Gender Classes**

Financial Variables	All	Loan Decision		Racial Classes		Gender Classes	
		Approved	Rejected	White	Non-White	Male	Female
Total Assets (\$)	504,819	541,593	455,630	549,928 <sup>a</sup>	231,560 <sup>a</sup>	505,957	496,465
Total Net Worth (\$)	165,461	191,125	131,132	181,485 <sup>a</sup>	68,387 <sup>a</sup>	159,318	210,554
Gross Farm Income (\$)	272,649	295,331	242,311	295,087 <sup>a</sup>	136,727 <sup>a</sup>	287,058 <sup>a</sup>	166,878 <sup>a</sup>
Net Farm Income (\$)	58,060	68,919 <sup>b</sup>	43,535 <sup>b</sup>	63,595 <sup>a</sup>	24,528 <sup>a</sup>	59,470	47,705
Return on Assets (%)	23.21	29.64 <sup>b</sup>	14.61 <sup>b</sup>	23.68	20.40	24.00	17.43
Net Profit Margin (%)	19.82	26.36 <sup>a</sup>	11.06 <sup>a</sup>	21.28 <sup>b</sup>	10.97 <sup>b</sup>	18.32 <sup>a</sup>	30.82 <sup>a</sup>
Repayment Margin Ratio	1.36	1.75 <sup>a</sup>	0.84 <sup>a</sup>	1.40	1.12	1.18 <sup>a</sup>	2.67 <sup>a</sup>
Current Ratio	2.97	4.78 <sup>b</sup>	0.55 <sup>b</sup>	3.39 <sup>b</sup>	0.45 <sup>b</sup>	1.87	11.05
Debt-Asset Ratio	0.90	0.76	1.08	0.91	0.81	0.93 <sup>c</sup>	0.64 <sup>c</sup>
Loan Amount	165,127	179,422 <sup>b</sup>	146,007 <sup>b</sup>	170,620 <sup>a</sup>	131,853 <sup>a</sup>	154,399 <sup>b</sup>	243,882 <sup>b</sup>
No. of Observations	367	210	157	315	52	323	44

<sup>a, b, c</sup> Denote significance at the 99%, 95% and 90% confidence levels, respectively.

**Table 3. Means of Financial Performance Measures of Approved and Rejected Loan****Applications by Gender Class**

Financial Variables	Male Borrowers		Female Borrowers	
	Approved	Rejected	Approved	Rejected
Total Assets (\$)	529,089	47,647	619,632	258,341
Total Net Worth (\$)	182,086	130,297	247,543	139,041
Gross Farm Income (\$)	313,379	253,507	182,684	136,321
Net Farm Income (\$)	70,212	45,777	60,845	22,302
Return on Assets (%)	32.12	13.65	14.19	23.71
Net Profit Margin (%)	24.41	10.56	38.57	15.83
Repayment Margin Ratio	1.45	0.83	3.58	0.91
Current Ratio	2.92	0.54	16.45	0.60
Debt-Asset Ratio	0.78	1.13	0.63	0.67
Loan Amount	160,228	146,969	299,221	136,893
No. of Observations	181	142	30	14

**Table 4. Heckman Maximum Likelihood Estimation Results**

Variables (Standard errors in parentheses)	All Borrowers		Male Borrowers		Female Borrowers	
	Likelihood of Approval	Loan Amount Approved	Likelihood of Approval	Loan Amount Approved	Likelihood of Approval	Loan Amount Approved
Intercept	0.5270 <sup>a</sup> (0.1737)	12.4733 <sup>a</sup> (0.2054)	0.4856 <sup>a</sup> (0.1777)	12.4089 <sup>a</sup> (0.2185)	0.7199 (1.3072)	11.9337 <sup>a</sup> (0.6017)
A. Financial Performance Indicators						
Return on Assets	0.1666 (0.1777)	-0.0103 (0.0900)	0.2845 (0.1914)	-0.0259 (0.0863)	-1.8774 (1.2050)	-0.2471 (1.3719)
Current Ratio	0.0493 (0.0391)	-0.0016 (0.0019)	0.0457 (0.0376)	0.0067 (0.0042)	0.2826 (0.4031)	-0.0009 (0.0017)
Debt-Asset Ratio	-0.0587 (0.0456)	0.1535 (0.1386)	-0.0814 (0.0545)	0.0749 (0.1399)	0.3857 (0.3137)	2.1691 <sup>a</sup> (0.3560)
Repayment Margin Ratio	1.0194 <sup>a</sup> (0.1760)	0.0083 (0.0336)	1.0452 <sup>a</sup> (0.1921)	-0.0704 (0.0590)	0.9013 <sup>a</sup> (0.3410)	0.1154 <sup>a</sup> (0.0460)
Net Farm Income Ratio	0.0768 (0.2316)	0.1833 (0.1299)	0.0401 (0.2329)	0.1883 (0.1248)	0.9633 (1.5250)	-0.0996 (0.8429)
Working Capital Requirement		4.84e-07 <sup>c</sup> (2.59e-07)		3.86e-07 (2.49e-07)		0.00001 <sup>a</sup> (2.96e-06)
Asset Turnover		0.0279 (0.0223)		0.0377 <sup>c</sup> (0.0215)		0.4481 (0.3736)
B. Structural, Demographic and Location Dummy Variables						
Female	-0.1111 (0.2731)	0.5108 <sup>a</sup> (0.1873)				
Non-White	-0.1502 (0.2242)	-0.2681 (0.2007)	-0.4067 (0.2542)	-0.4527 <sup>c</sup> (0.2388)	2.7692 <sup>a</sup> (0.6228)	-0.2639 (0.3955)
Direct Loan	-0.5005 <sup>a</sup> (0.1684)	-1.0687 <sup>a</sup> (0.1330)	-0.3581 <sup>b</sup> (0.1763)	-0.9176 <sup>a</sup> (0.1322)	-3.7176 <sup>a</sup> (0.9485)	-2.3293 <sup>a</sup> (0.3355)
Size	-0.2686 <sup>a</sup> (0.1626)	-0.7090 <sup>a</sup> (0.1265)	-0.2956 <sup>c</sup> (0.1681)	-0.7446 <sup>a</sup> (0.1304)	0.0138 (0.9873)	-0.9717 <sup>a</sup> (0.3339)
East		-0.4209 <sup>b</sup> (0.1779)		-0.4202 <sup>b</sup> (0.1899)		0.1002 (0.3539)

South		-0.4812 <sup>a</sup> (0.1715)		-0.3482 <sup>c</sup> (0.1811)		-0.9323 <sup>b</sup> (0.4467)
Central		-0.4197 <sup>b</sup> (0.1805)		-0.2574 (0.1882)		-0.8594 <sup>c</sup> (0.4636)
District 6		-0.0486 (0.2413)		0.0547 (0.2488)		2.0324 <sup>b</sup> (1.0003)
Log Likelihood	-436.3395		-373.4352		-29.3311	
Wald Chi-Square	148.31 <sup>a</sup>		131.59 <sup>a</sup>		212.81 <sup>a</sup>	
LR Test of Independence (Chi-Square)	2.12		2.10		2.74	
Uncensored Observations	210		181		30	

<sup>a, b, c</sup> Denote significance at the 99%, 95% and 90% confidence levels, respectively.